

CHAPTER 7

# Oak and Pine Barrens Communities

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DESCRIPTION

**T**he oak and pine barrens communities of Wisconsin are two of the four types of savanna described by Curtis (1959). Oak opening is discussed in the previous chapter. Cedar glade, a very specialized savanna, is not discussed in this report. In this chapter the other two types of savanna, the closely related oak and pine barrens, are covered along with bracken grasslands.

“Barrens” are plant communities that occur on sandy soils and are dominated by grasses, low shrubs, small trees, and scattered large trees. One consistent element of all barrens, is their dependence on fire and the major role it plays in their dynamics. Fires have burned on Wisconsin barrens for thousands of years.

“Barrens” are plant communities that occur on sandy soils and are dominated by grasses, low shrubs, small trees, and scattered large trees. Curtis (1959) described these communities as pine barrens in northern and central Wisconsin and as oak barrens in southern and west-central Wisconsin. Because of their dynamic nature and the variability in structural types and species composition, they are difficult to describe and classify. For example, Eric Epstein (Wis. Dep. Nat. Resour., pers. comm.) studied the original land survey notes for the area that is now southern Fort McCoy and found that the surveyor had characterized the vegetation variously as “oak openings,” “oak brush,” “pine-oak woodland,” “pine brush,” “oak forest,” and “level prairie.” Many northern pine barrens are referred to as “brush prairie.” This range of names derives from the many forms that barrens have. Prior to Euro-American settlement, the vegetative structure of large barrens landscapes was quite variable and dynamic. Inclusions of variously sized and aged forest stands such as mature red pine, mature oak (bur, red, Hill’s, or black), aspen groves, and numerous wetlands were typical of most presettlement pine and oak barrens (Murphy 1931).

One consistent element of all barrens, though, is the dependence of barrens on fire and the major role that fire plays in their dynamics. Fires have burned on Wisconsin barrens for thousands of years. Prior to Euro-American settlement, fires were caused by lightning or were set by Native Americans. Native Americans used fire to maintain game habitat, drive game, and enhance fruit and berry crops. Historically, behavior of fire was greatly influenced by topography and soil factors. Natural wildfires usually produce a complex mosaic of burned and unburned

patches depending on fire intensity, topography, soil moisture, and local weather (Niemi and Probst, 1990). True savanna (widely scattered large trees over a prairie-like understory) was likely maintained by frequent fires of relatively low intensity. Brush prairie may have been subject to a more erratic fire regime with occasional catastrophic events that reduced the oaks to the grub stage.

Because of this long association with fire, the plants and animals that live on the barrens are adapted to periodic fire. Vogl (1970) states: "The question of whether fire is necessary to maintain northern Wisconsin pine barrens is perhaps not an appropriate question, for all factors including soil type, soil fertility, topography, climate, drought, and fire are inseparably linked and operate together or in chain reactions and cannot be considered individually. Fire is one of the essential ingredients of pine barrens, but the critical factor in determining the presence of barrens among northern pine-hardwoods forests is not so much fire, but the presence of sandy plains; sites with low fertility that lend themselves to droughts and fires of the proper intensities and frequencies to produce a vegetational structure and composition called barrens." Much still needs to be learned about the relationships between fire and barren structure and composition (Mossman et al. 1991).

## PINE BARRENS

Curtis (1959) describes pine barrens as follows:

*These barrens are true savannas, in that the dominant plants are grasses, forbs and shrubs, with a scattered stand of trees. The most usual tree is jack pine, although red pine may be the main species in unusual cases. Hill's oak is usually present as a grub or as a scattering of larger trees . . . The outstanding feature of the groundlayer in the pine*

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*barrens is the extraordinary development of shrubs. This is . . . far higher than for any other community in Wisconsin. Two of the shrub species, redroot . . . and huckleberry . . . , reach their maximum Wisconsin levels in this community; but*

*the blueberry . . . is of even greater importance . . .*

*Another shrub which is highly characteristic of the barrens is the sweet fern . . .*

*The 134 [plant]*

*species found in the barrens are distributed in 48 families, of which these five contain over one-half of the total: Compositae-23.9 per cent, Gramineae-10.4 per cent, Rosaceae-8.2 per cent, Liliaceae-6.7 per cent, and Ericaceae-6.0 per cent . . . [T]here is no doubt that the immediate cause of a pine barren is fire. In this case, soil and topography are major contributing factors, since it is essential that the fires be repeated at such short intervals as to prevent the active reseeding of jack pine from its serotinal cones.*

Vogl (1964a, 1970) studied northern Wisconsin pine barrens and found "the locations of northern Wisconsin pine barrens correlated with the distribution of sandy soils, great forest fires, present fire hazard areas, sites subject to local drought, the last strongholds of prairie grasses, and areas of past farming failures and forest

This is a typical pine barrens in Florence County. The dominant tree is jack pine with an understory dominated by sweet fern, hazelnut, and sedges. Also found there are species in the heath family and native grasses found on poor soils, such as Kalm's brome grass and poverty oat grass. Photo by Eric Epstein.

planting difficulties.” Vogl found that the pine barrens possess some characteristic plant species even though plant communities vary in different barrens. Prairie-influenced pine barrens in far northwestern and northeastern Wisconsin averaged 26 more plant species than pine barrens in north-central Wisconsin. Prairie plants were present in the far northwest and northeast, but absent in the north-central pine barrens. Shively and Temple (1994) describe pine barrens as an open grassland with scattered trees and shrubs, i.e., a pine savanna. They describe a pine-shrub-grassland ecosystem as a varying mosaic of vegetation structural types that occur on sandy glacial outwash plains, developing and deteriorating in response to periodic disturbance.

Prior to Euro-American settlement many pine barrens were diverse. Some resembled a pine savanna with mature red pine occurring in densities of two to eight trees per acre and an average diameter at breast height (dbh) of 13 inches. Early logging eliminated the mature trees. Severe, repeated fires, along with more cutting and land-clearing, removed the seedlings and remaining red pine seed sources.

Several specific Wisconsin barrens sites were described historically. Fassett (1944) described barrens near the Brule River in Douglas County in 1854 as a region of frequent fires, covered with small jack pine and occasional large scattered red pine. Oak trees and oak brush often accompanied and sometimes replaced the jack pines. Matthiae and Stearns (1978) and Vora (1993) recount historical records describing the Moquah Barrens in Bayfield County in 1858 as a diverse landscape with openings of various sizes, areas with scattered trees, some open forest and some closed-canopy forests about 60 years old. Vogl (1964b) recounts historical descriptions of Crex Meadows in Burnett County in 1853 as a jack pine—scrub oak—prairie savanna. The surveyors’ records refer to a jack pine savanna consisting of large, open-grown jack pines scattered across a level to rolling landscape with some scattered red pine and scattered areas of oak bushes. The

Dunbar Barrens occur in Marinette County. Although we have no 19th-century description of this site, in the 1960s LeRoy Linteur (Wis. Dep. Nat. Resour., retired, pers. comm.) found various species of reindeer moss present, with sedges more abundant than grasses. Sand willow and sand cherry were common. Barnes (1974) quotes the description of the northwestern Wisconsin pine and oak barrens published by E. T. Sweet in 1875: “The trees are either scrub-pine or black-jack oak, averaging in diameter about three or four inches and in height not over fifteen feet. In some places, as in the sand hills of the barrens, the trees are at considerable distances from each other, and in other places the little scrub pines, not over two inches in diameter, are so close together as to constitute a nearly impenetrable thicket. On the sides of the barrens, and in low places, quite large groves of norway pine are frequently found.”

## OAK BARRENS

Curtis (1959) describes oak barrens as follows:

*Several of the early writers mentioned that the bur oaks and white oaks of the heavy soil openings were replaced by black oaks on the sandy areas, but few detailed descriptions of the type exist. Most of the comments refer to the jack pine barrens found on similar sites in the north. Actually the two types are closely related and intermediate mixtures of both oak and pine are widespread in central and northwestern counties. For purposes of this discussion, oak barrens are considered to be those savannas which have black oak or Hill’s oak as their most prominent tree and in which jack pine is absent. As such, they are located entirely in the prairie-forest province south of the tension zone. They are prominent on the outwash-filled valleys of the Wisconsin River from Portage to Arena and the Sugar River in Green County, and on the sandy uplands of Marquette and Waushara counties . . . . The origin of the scrub oak savannas is*



*the same as that of the oak openings—  
degradation of prior forests by fire.  
Maintenance is also by fire, but with the  
major difference that the tree component  
is likely to be completely destroyed at  
rather frequent intervals.*

Finley (1976) states: “Some minor portions of the oak region were in neither oak forest nor oak openings. These were the so-called oak barrens where thin stands of scrubby dwarf oak grew on sandy soils. The sparse growth appears to have been due more to the sandy earth material rather than to climatic influences. The uniqueness of the oak barrens resulted from the open spacing of the trees, the small size of the trees, and the otherwise barren character of the surface. This type of vegetation occurred in small fragmented areas in Eau Claire County, eastern Dunn County, and western Chippewa County.”

Barnes (1974) found the oak-pine barrens of Eau Claire County very heterogeneous, with the oak and pine generally forming a mosaic of separate stands of various sizes. The Eau Claire County barrens were probably open areas that contained few trees interspersed with rather dense stands of oak and pine.

Habeck (1959) describes a general picture of the vegetation in Juneau and Jackson counties prior to the turn of the century provided by Filibert Roth in 1898: “Roth stated that much of the central Wisconsin sand plains was covered with scrub oak and jack pine openings, with some portions covered with dense groves of jack pine and a few islands of mature red pine and white pine. Mesic upland hardwood forests were apparently not present or not common enough to draw Roth’s attention. Roth further stated that there were extensive bare wastes which he believed were the result of logging and burning.”

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Holtz (1985) described a black oak barrens in Sauk County as a dynamic community of trees, shrubs, and understory plants that is maintained through

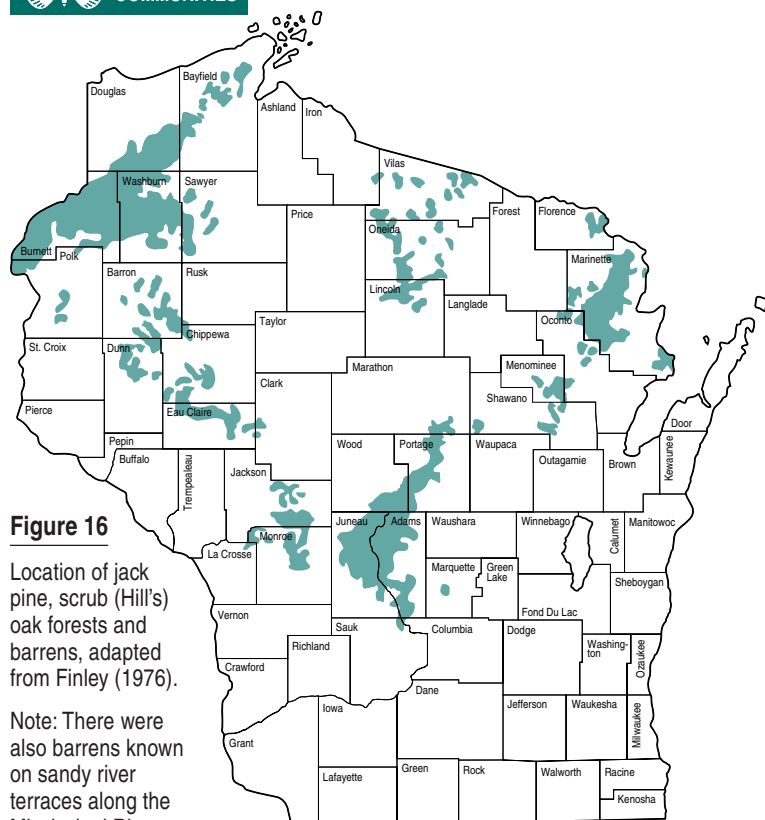
periodic fire. After decades without fire, many understory plant species persist as dwarfed, nonreproducing culms and rhizomes or as old seeds. If remnant barrens plants are on site, former barrens can be

restored by a combination of cutting to open the canopy and prescribed burning.

This barrens has large, open-grown oaks with a sand-prairie understory including such species as lupine, little bluestem grass, and June grass. If not subjected to fire, oak barrens over time become more like southern dry forest. Notice in the foreground the oak seedlings and saplings in the understory which over time may form a more closed canopy. Photo by Cathy Bleser.

## BRACKEN GRASSLANDS

Curtis (1959), Vogl (1964b), and Levy (1970) identified bracken grasslands, sometimes called frost pockets, as a distinct vegetation type. Bracken grasslands are large forest openings dominated by various grasses and bracken fern. Probably some of the original pine barrens of northern Wisconsin included bracken grasslands. Bracken grasslands occur on a variety of soils, from fine sands to loams. Bracken grasslands on loamy soils are thought to originate after clearcutting and intense wildfire. However, some bracken grasslands on sandy soils may be natural communities of the same nature and origin as the southern Wisconsin prairies (Curtis 1959).



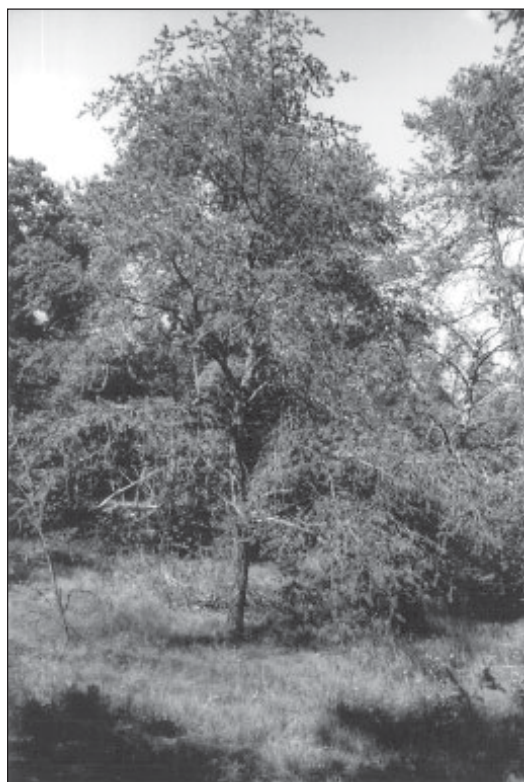
**Figure 16**

Location of jack pine, scrub (Hill's) oak forests and barrens, adapted from Finley (1976).

Note: There were also barrens known on sandy river terraces along the Mississippi River, Lower Wisconsin River, Chippewa River, and Black River.

Levy (1970) recognized two forms of bracken grassland. One form is found on loamy soils and is characterized by exotic plants such as quack grass, Kentucky bluegrass, and Canada thistle. The other

Pine Barrens are also found along the lower Wisconsin River and other rivers in the Driftless Area. This barrens in Richland County along the Wisconsin River has large jack pine and scrub oak with an understory of sedges, prickly pear, blueberry, and some typical prairie species. *Photo by Signe Holtz.*



form is found on sandy soils and is characterized by blueberries and sweet fern. Exotic plants form a high content in both forms.

Vogl (1964b) and McCaffery and Creed (1969) concluded that several factors operate in combination to maintain bracken grasslands. Tree reproduction is limited by frost, animal browsing, plant allelopathy, dense sod, and a dense bracken fern canopy cover.

## STATUS

### PAST

Pine barrens originally covered 2.3 million acres, or 7% of Wisconsin's presettlement landscape (Figs. 10 and 16). Oak barrens covered 1.8 million acres, or 5% of the presettlement landscape. Mossman et al. (1991) state: "Prior to settlement, barrens habitats were widespread in Wisconsin, always associated with coarse-textured sandy or gravelly soils. The most extensive barrens were in large areas of sandy glacial outwash, or in the sandy beds of extinct glacial lakes, but they also occurred on river terraces, old dune systems, gravelly moraine, and sandspits. Geographically, areas of extensive barrens were concentrated in northeastern, north-central, northwestern and central Wisconsin. They were also common on the extensive outwash terraces along the Lower Wisconsin, Lower Chippewa and Mississippi Rivers. In general, trees occurred in low density, usually as scattered individuals or in small groves, punctuating an open grassy landscape that was often dotted with deciduous brush. Where outwash was pitted, the topography was more pronounced and varied and lakes and wetlands were sometimes frequent. In such areas, the pattern of vegetation was likely to be a mosaic of open prairie-like areas, brush, savanna, and occasional stands of deciduous, coniferous or mixed forest. The interplay of topographic and edaphic factors strongly influenced the behavior and effects of the primary disturbance factor affecting the barrens—fire—and is

responsible for much of the structural, and compositional variability demonstrated by this community.”

Because of the dynamic nature of barrens and their inherent variability, there is a general lack of knowledge of the exact structure of barrens. Some aspects of barrens that were described by early European explorers appear to have disappeared from today’s landscape. For example, some pine barrens were described as having large mature trees, either as widely scattered individuals or dense clusters of mature trees. Pine savannas with scattered large trees are extremely rare.

### PRESENT

Eric Epstein (Wis. Dep. Nat. Resour., pers. comm.) summarized Natural Heritage Inventory data and identified approximately 10,000 acres of pine and oak barrens remaining at 65 sites (Table 5). These figures do not include all of the pine and oak barrens in Wisconsin. The most significant omissions are portions of the large managed barrens on county, state, and federal lands in northwestern Wisconsin and on the Necedah National Wildlife Refuge in central Wisconsin. Some of the managed barrens are reclaimed forest or abandoned farmland with reduced floristic compositions. The 1,432 acres of southern oak barrens at 20 sites is a fairly accurate estimate.

The Natural Heritage Inventory lists pine barrens as G3 (very rare and local throughout its range or found locally) and oak barrens as G2 (imperiled globally because of rarity) (see Table 1). Most remaining pine and oak barrens exist as small, isolated fragments on about a dozen state or federal managed areas. Most of these fragments are too small and isolated to ensure long-term viability of all their characteristic native plants and animals.

Because of the dynamic nature of barrens and their inherent variability, there is a general lack of knowledge of the exact structure of barrens. Some aspects of barrens that were described by early European explorers appear to have disappeared from today’s landscape.



For example, a minimum of 10,000 acres of pine barrens has been recommended for long-term survival of an isolated sharp-tailed grouse population with limited hunting (Temple 1992).

### VEGETATION

**Pine Barrens.** Most of northern Wisconsin’s pine barrens have succeeded to northern dry forest. Recently, Kotar et al. (1988) published a natural classification system for northern Wisconsin. This system utilizes interpretation of natural vegetation along soil moisture and nutrient gradients with emphasis on understory species. The following habitat types from the Kotar system can be used to describe the present status of former barrens in northern Wisconsin.

This is the most intact red pine savanna in Wisconsin. Located on the Lake Superior shoreline of one of the Apostle Islands, this site has an understory of common juniper, native grasses and sedges, blueberry, false heather, and sand cherry. The groundlayer includes species that are characteristic of dune and lakeshore communities and many species not found in Wisconsin except near the Lake Superior shore. *Photo by Signe Holtz.*

**Table 5**  
Remaining acreage of intact Wisconsin pine and oak barrens, 1992, as listed in DNR’s Wisconsin Natural Areas Inventory.

Classification	Acreage		
	Pine Barrens	Oak Barrens	Total
Undisturbed	3,952	420	4,372
Moderately disturbed	3,421	280	3,701
Disturbed	1,205	732	1,937
Total	8,578 (45 sites)	1,432 (20 sites)	10,010 (65 sites)



In central and southern Wisconsin counties the former barrens communities now support extensive pine plantations, irrigation agriculture, or a natural growth of dry oak forest.

Most remaining pine and oak barrens exist as small, isolated fragments—too small and isolated to ensure long-term viability of all component plant and animal species. It is estimated that the population of one species, sharp-tailed grouse, shown here in a picture taken in 1942 in Wood County, would require a minimum of 10,000 acres of pine barrens for long-term survival with limited hunting. *Photo by Dorothy Cassoday.*



The pin oak/wintergreen-New Jersey tea forest habitat type occurs in Burnett, Washburn, and Douglas counties. The dominant landform is pitted outwash; the dominant soil is dry, nutrient-poor sand. The following species are diagnostic: New Jersey tea, sweet fern, wintergreen, bush honeysuckle, cow-wheat, trailing arbutus, bearberry, and sessile bellwort. Within this general habitat type the common forest types are jack pine, scrub oak forests and barrens, jack pine-pin oak, pin oak, aspen, and red pine.

The red oak-red maple/trailing arbutus forest habitat type which occurred in the former barrens in Marinette, Menominee, Oconto, Florence, Lincoln, Oneida, and Vilas counties has been replaced by forest cover of jack pine, red pine, aspen, and red oak-red maple. Understory vegetation includes bracken fern, grasses, sedges, blueberry, wintergreen, and trailing arbutus. Low shrubs are more common than tall shrubs. Dry, nutrient-poor soils predominate.

A white oak-pin oak/lead plant forest habitat type occurs in extreme northwestern Polk County and southwestern Burnett County. This habitat type appears to represent a prairie-forest transition. Common forest cover types include jack pine, scrub oak forests, and barrens.

Some barrens communities were located on the red maple-red oak/low sweet blueberry habitat type, which occurred in the former barrens of north-central and northeastern Wisconsin. The current common forest cover types occurring on this habitat type include aspen-white birch, aspen-red oak, aspen-pines, jack pine, red pine, white pine, red oak, red oak-red

maple, and balsam fir-white spruce. This habitat type has more moisture, is more mesic, and quickly succeeds to closed canopy forest.

**Oak Barrens.** In central and southern Wisconsin counties the former barrens communities now support extensive pine plantations, irrigation agriculture, or a natural growth of dry oak forest. In relatively undisturbed forests, prairie grasses and forbs reappear if the forest cover is clearcut and the logging slash burned (Holtz 1985).

**Bracken Grasslands.** In northern Wisconsin the land area in bracken grasslands has significantly declined. Fire control, tree planting, and aspen sprouting following clearcutting of adjacent forest resulted in conversion of most bracken grasslands to balsam fir, white pine, and aspen. About 1% to 2% of the northern public forest lands exist in forest openings or bracken grassland. A white-tailed deer habitat maintenance program undertaken by the Department and the U.S.D.A. Forest Service has maintained these small, scattered bracken grasslands.

## ANIMALS

Barrens are inhabited by animals that require open, brushy habitats. Large, open barrens are critical habitat for sharp-tailed grouse (Hamerstrom and Hamerstrom 1952, Gregg 1987); barrens large enough to sustain a viable population of sharptails will also sustain populations of other plants and animals common to large, open, brushy habitats. The particular structure of each barrens will dictate the particular complement of species present and their relative abundance.

Jackson (1961) and Hamilton and Whitaker (1979) report that the following mammals find preferred habitat in barrens: thirteen-lined ground squirrel, plains pocket gopher, prairie deer mouse, coyote, badger, white-tailed deer, and striped skunk.

Elk may have been another important species on barrens in presettlement times. Pierre Radisson described elk as fairly

abundant in parts of northwestern Wisconsin in 1658-60 (Seno 1985), but Schorger (1954) gives only one literature reference for elk in northwestern Wisconsin in the 1800s (in the Superior area). Apparently elk were more abundant in the oak savannas, forest edge, and open woodlands of southern and central Wisconsin (Schorger 1954).

Faanes (1981), Hoffman and Mossman (1990), and Mossman et al. (1991) described the birds of barrens and young pine forest. Mossman et al. (1991) describe the barrens bird community:

*The barrens is a tenuous community pulled in opposing directions by fire/frost and succession. The barrens avifauna responds to the variety and pattern of structures and dominant plant forms in this dynamic community, and can be seen as a variable combination of elements from related communities such as dry prairie (Sample and Hoffman 1989), xeric pine and hardwood forest (Hoffman and Mossman 1990) . . . . Yet barrens also represent a real natural community with unique characteristics, and has undoubtedly been a major component of the upper Midwest landscape for centuries; thus it is not surprising that several bird species appear to be especially adapted to it.*

*Altogether, the most common and regular species of Wisconsin pine and oak barrens are blue jay, common yellowthroat, rufous-sided towhee, brown-headed cowbird, and the chipping, clay-colored, field, and vesper sparrows. Other characteristic species that are found here equally or more commonly than perhaps in any other native Wisconsin community include sharp-tailed grouse, upland sandpiper, northern flicker, eastern kingbird, eastern bluebird, brown thrasher, Tennessee warbler, lark sparrow, Brewer's blackbird and American goldfinch.*

*Open barrens are characterized by dry sand prairie birds, most of which tolerate or prefer some low (<1 m tall*

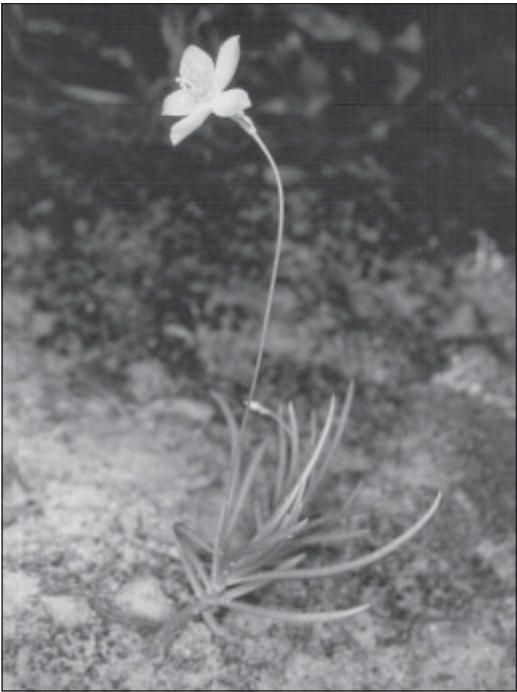
*[3.1 ft]) woody vegetation: chipping, clay-colored, field, vesper, grasshopper and song sparrows, upland sandpiper, brown thrasher, bobolink, western meadowlark, Brewer's blackbird, brown-headed cowbird and American goldfinch. Common nighthawk is another species common to open barrens and dry sand prairie. The relatively high abundance of Brewer's blackbirds in open barrens is partly a consequence of its common association with recently burned sites and dead, fallen wood. In some cases, song sparrows also seem attracted to recently burned areas where remain charred stems of shrubs and oak grubs. Nearly all of the species of Wisconsin's dry prairies are well represented in open or other types of barrens. Because these barrens are generally larger, and in many cases more manageable than southern Wisconsin's isolated, dry prairie relics, they serve an important role in maintaining this natural association of breeding-bird species, especially for those such as upland sandpiper that require large tracts.*

Vogt (1981) found Cope's gray treefrog, American toad, five-lined skink, hognose snake, green snake and bullsnake common in Wisconsin pine and oak barrens. James Hoefler (Wis. Dep. Nat. Resour., pers. comm.) reports prairie skink common in northwestern barrens. Eric Epstein (Wis. Dep. Nat. Resour., pers. comm.) reports the six-lined racerunner and slender glass lizard present in west-central Wisconsin pine and oak barrens. Barrens habitats may be important nesting sites for aquatic turtle species that lay their eggs in upland, often sandy soils (Robert Hay, Wis. Dep. Nat. Resour., pers. comm.).

In general, little is known about the invertebrates that occupy the barrens community or the ecological function they fulfill. An exception is the butterfly and moth fauna, which has been extensively studied by Ferge (1990). Based on his publication and his personal records, we were able to compile a list of butterflies and moths of barrens habitats (Table 6). Endan-



Prairie fameflower (*Talinum rugospermum*) occurs in sand prairies within barrens complexes in central and west central Wisconsin. This individual is growing on sand that has eroded from a sandy rock outcrop. Photo by Thomas A. Meyer.



gered, threatened, and other rare species are covered in more detail in the following paragraphs.

### RARE SPECIES

**Table 6**

Butterflies and moths of barrens habitats.

**Endangered Species.** Larvae of the Karner blue butterfly, a federally endangered species found primarily in northwest-

ern and central Wisconsin, feed only on lupine. Midwestern populations of the wide-ranging northern blue butterfly are restricted by the distribution of its sole larval food plant, the dwarf bilberry. These species are known from very limited locations in central and northeastern Wisconsin (Ebner 1970). The phlox moth is found in Eau Claire County. The sand violet is found in west-central Wisconsin pine barrens. The rough white lettuce, phlox moth, and slender glass lizard have recent records at Fort McCoy (Eric Epstein, Wis. Dep. Nat. Resour., pers. comm.). Several singing males of the federally endangered Kirtland's warbler have been located in west-central and northwestern Wisconsin pine barrens.

**Threatened Species.** The frosted elfin butterfly is restricted to pine and oak barrens that contain large populations of lupine and false wild indigo (larval food plants). The wooly milkweed has historical records from sandy barrens near Necedah National Wildlife Refuge and other central Wisconsin oak barrens and sand prairies. The brittle prickly pear is found in oak barrens, dry cliffs, and sand prairies mostly in central and west-central Wisconsin.

Species	Range**	Flight	Status**	Larval Host
<b>Moths</b>				
<i>Saturniidae</i> —Giant Silkmoths				
<i>Hemileuca nevadensis</i> (Nevada buck moth)	Burnett & Douglas Co.	Sept	local	prairie willow, poplar
<i>Sphingidae</i> —Sphinx Moths				
<i>Hemaris gracilis</i> (graceful clearwing)	N,C	May-Jun	rare	blueberry
<i>Notodontidae</i> —Prominents				
<i>Hyparpax aurora</i> (pink prominent)	C	Jun	local	oak
<i>Arctiidae</i> —Tiger Moths				
<i>Grammia celia</i>	C	May-Jun	local	unknown
<i>Pygarctia spraguei</i> (Sprague's pygarctia)	C	Jun	local	<i>Euphorbia</i>
<i>Noctuidae</i> —Owlet or Noctuid Moths				
<i>Schinia indiana</i> phlox flower moth	Eau Claire Co.	Jun	<b>Endangered</b>	<i>Phlox pilosa</i>
<i>Heliothis borealis</i>	N,C	May	local	unknown

Species	Range**	Flight	Status**	Larval Host
<b>Butterflies</b>				
<i>Hesperiidae</i> —Skippers				
<i>Erynnis brizo</i> (sleepy dusky wing)	State	May-Jun	M	oak
<i>Erynnis juvenalis</i> (Juvenal's dusky wing)	State	May-Jun	4	oak
<i>Erynnis persius</i> (Persius dusky wing)	C	May	3	lupine
<i>Hesperia comma laurentina</i> (Laurentian skipper)	N	Jul	3	grasses
<i>Hesperia leonardus leonardus</i> (Leonard's skipper)	N,C	Aug	M	grasses
<i>Hesperia Metea</i> (cobweb skipper)	N,C	May	M	grasses
<i>Hesperia sassacus</i> (Indian skipper)	N,C	Jun	M	grasses
<i>Atrytoropsis hianna</i> (dusted skipper)	W,C	May-Jun	M	<i>Andropogon</i>
<i>Amblyscirtes vialis</i> (roadside skipper)	N,W	May-Jul	M	grasses
<i>Pieridae</i> —Whites and Sulphurs				
<i>Euchloe olympia</i> (Olympian marble)	State	May	M	rock cress
<i>Colias interior</i> (pink edged sulphur)	N,C	Jun	M	blueberry
<i>Lycaenidae</i> —Harvesters, Coppers, Hairstreaks and Blues				
<i>Lycaena phlaeas americana</i> (American copper)	State	May-Aug	4	rumex
<i>Harkenclenus titus</i> (coral hairstreak)	State	Jul	4	cherry
<i>Satrium edwardsii</i> (Edward's hairstreak)	W,E,C	Jul	M	oak
<i>Incisalia augustinus</i> (brown elfin)	N,C	May	M	blueberry
<i>Incisalia polia</i> (hoary elfin)	N,C	May	M	blueberry
<i>Incisalia irus</i> (frosted elfin)	C	May	3	lupine
<i>Incisalia henrici</i> (Henry's elfin)	N,C	May	3	blueberry?
<i>Incisalia nippon clarki</i> (pine elfin)	N,C	May	M	jack pine
<i>Everes amyntula</i> (western tailed blue)	N	May	3	vetch?
<i>Glaucopsyche lygdamus couperi</i> (silvery blue)	State	May	M	lathyrus
<i>Lycaeidesidas nabokovi</i> (northern blue)	N	Jul	<b>Endangered</b>	dwarf bilberry
<i>Lycaeides melissa samuelis</i> (karner blue)	C	May-Aug	<b>Endangered</b>	lupine
<i>Nymphalidae</i> —Brush-Footed Butterflies				
<i>Charidryas gorgone carlota</i> (Gorgone checkerspot)	W,E,C	May-Sep	M	<i>Helianthus</i>
<i>Phyciodes batesii</i> (tawny crescent)	N,C	Jun	M	aster
<i>Satyridae</i> —Satyrs and Wood Nymphs				
<i>Oeneis chryxus strigulosa</i> (chryxus arctic)	N	May	3	grasses

\* From Ferge 1990, with additional information from 8 April 1991 correspondence from Leslie Ferge to the author.

\*\* Codes

N = Northern Highland south to Tension Zone

C = Central Sands and Burnett County

W = Driftless Area and Western Wisconsin

E = Eastern Ridges and Lowlands

Status: 3 = Resident, but rare and/or local in occurrence

4 = Common or widespread

M = Not really rare, but not widespread or numerous enough to regard as common.

Without active restoration and management the barrens community will probably disappear from all but a few large public land areas and a handful of small, isolated managed areas.

**Species of Special Concern.** Ternate grape fern, common hairgrass, and possibly Hookers' orchid may occur on or near barrens in pockets of northern dry forest. Prairie fameflower occurs in sand prairies within barrens complexes in central and west-central counties. In addition, there are some Great Plains plant species that reach their eastern range limits in the Polk, Douglas, and Burnett county barrens (Robert Read, Wis. Dep. Nat. Resour., pers. comm.).

### PROJECTED

Without active restoration and management the barrens community will probably disappear from all but a few large public land areas and a handful of small, isolated managed areas.

### ACTIONS CAUSING CONCERN

Since Euro-American settlement, the pine and oak barrens communities have been reduced to small scattered parcels with a simplified vegetative structure and a reduced composition of plants and animals. Control of wildfire, forest succession, pine plantation development, and agricultural development have all worked to bring the barrens communities to their current rarity.

Some citizens question the necessity and value of timber cutting and prescribed burning, management techniques used to restore barrens. Air quality standards applicable to prescribed burning need to be clarified. Some land managers and citizens consider the barrens landscape as, indeed, barren or worthless. The great habitat values and aesthetic appeal of barrens remain largely unrecognized.

Despite the neglect and abuse that most barrens have undergone since settlement, this is one of our most resilient natural communities, and it will respond to careful management by controlled [prescribed] burns and cutting.

### SOCIO-ECONOMIC ISSUES

Landowners and land managers often see barrens management as reducing their ability to grow commercial trees. Some people find the barrens an exceptionally aesthetic landscape where native plants and animals have adapted to the very poor site nutrient quality and open character. Wisconsin's former barrens landscapes could be used by citizens for a variety of products and purposes. These include wood fiber, food, game animals (including sharp-tailed grouse), and native plant and animal populations. A combination would best meet the overall needs of Wisconsin's citizens.

### POTENTIAL FOR COMMUNITY RESTORATION

Mossman et al. (1991) state: "Wisconsin's oak and pine barrens evolved in a dynamic landscape governed largely by the forces of succession, fire and frost. Variety of this landscape was imparted by the variable influences of climate, topography, soils, moisture regimes and fire barriers. Despite the neglect and abuse that most barrens have undergone since settlement, this is one of our most resilient natural communities, and it will respond to careful management by controlled [prescribed] burns and cutting. Moreover, its economic land value

is generally low, and comparatively little has been permanently converted to other uses. Perhaps for no other native community are the opportunities for large-scale restoration so great."

Department wildlife areas in northwestern Wisconsin, the Necedah National Wildlife Refuge, and the Chequamegon National Forest's Moquah Barrens form the nucleus for large landscape-scale barrens



management. Barrens can be restored through cutting and prescribed fire (Holtz 1985, Vora 1993, U.S. Fish and Wildlife Service 1994) or through a combination of cutting, limited herbicide use, and prescribed fire (Paul Kooiker and Mike Zeckmeister, Wis. Dep. Nat. Resour., pers. comm.).

Shively and Temple (1994) describe a pine-shrub grassland restoration plan with goals of increasing area and decreasing fragmentation of barrens, restoring the full natural range of variation in structure and composition of patch types in barrens landscapes, and obtaining statewide support and involvement of state residents.

## POSSIBLE ACTIONS

The following possible actions are consistent with ecosystem management, but require more analysis and discussion. How priorities are set within this list will be based on ecoregion goals, staff workload, fiscal resources, public input and support, and legal authority. We will work with our customers and clients to set priorities and bring recommendations to the Natural Resources Board for consideration beginning in the 1995-97 biennium.

1. Restore several large pine and oak barrens communities. These actions may include the following:

- ▲ Continue development of Fish Lake Wildlife Area in Burnett County to establish large barrens and savanna.
- ▲ Continue management of Crex Meadows and Kohler Peet areas. Explore opportunities to work with Burnett County to manage county forest land between the two areas for a connecting corridor of ecologically functional barrens habitat.
- ▲ Continue restoration and expansion of barrens habitat within the approved Namekagon Barrens Wildlife Area. The goal will be restoration and maintenance of an extensive barrens landscape that includes various barrens types.
- ▲ Work with Douglas County to expand and continue development of

Douglas County Wildlife Area. Expansion could include about one section (640 acres) of additional land.

- ▲ Encourage the Chequamegon National Forest to continue to enlarge Moquah Barrens. Support creation of a large barrens landscape around the Moquah Barrens Wildlife Area including old-growth jack pine, scattered red pine, frost pockets, seepage lakes, and small wetlands.
  - ▲ Continue restoration and management of a large oak barrens at Necedah National Wildlife Refuge.
  - ▲ Work with local officials in Adams and Juneau counties and Monroe and Jackson counties to explore the opportunity for restoration of large barrens. Because of its geographic location, this area supports a far greater diversity of barrens plants and animals than other areas of the state, including more threatened and endangered species.
2. Restore smaller barrens to conserve plant and animal species diversity. For example,
- ▲ Continue the development of suitable barrens habitat on Amsterdam Sloughs Wildlife Area.
  - ▲ Manage the Dunbar Wildlife Area to restore barrens.

- ▲ Manage the Spread Eagle Wildlife Area to restore a barrens landscape that includes wetlands, Pine River shoreline, and seepage lakes.
  - ▲ Continue restoration and management of oak barrens at the Sandhill Wildlife Area.
  - ▲ Work with the Nicolet National Forest to explore opportunities for restoration of barrens in the Lake-wood District.
  - ▲ Work with federal Department of Defense officials to restore an oak barrens at Fort McCoy, Monroe County.
  - ▲ Protect and manage scattered small barrens to enhance populations of locally rare plant and animal species. Included here are the 1/4-mile-wide fire breaks maintained on state and county forests in northwestern Wisconsin and tracts along the Lower Wisconsin River.
  - ▲ Maintain and restore the scattered bracken grasslands on public lands in northern Wisconsin.
3. Restore and manage pine and oak barrens with a variety of structures including brush prairie, pine savanna, older jack pine stands, and mature red pine pockets. The barrens landscape should also contain grassland, frost pockets, wetlands, and lakes. This landscape will best meet the needs of a wide variety of barrens plants and animals.
  4. Maximize the connectivity of pine and oak barrens restorations using techniques that are found to be effective by current conservation research. These may include the establishment of corridors of open land between barrens habitats. These corridors need to be carefully planned to avoid unintended effects such as species traps and the introduction of exotic species. Utility rights-of-way, railroads, or short rotation timber harvest could be used as corridors.
  5. Develop an education and awareness program to increase public and professional knowledge and appreciation of what barrens are, their past prevalence, their current rarity, and their management needs. Because of the barrens rarity, an education program is needed to develop support for restoration and management of barrens.
  6. Develop a policy on prescribed burning that recognizes the dependence of some ecosystems, including barrens, on fire and that examines the resources and staff support necessary to effectively and safely use fire to manage these fire-dependent communities. In addition, air quality standards and policies within the Department's Division of Environmental Quality will need to be clarified.
  7. Gather more information on the structure and composition of barrens that existed at various times in the past, drawing on a variety of sources, to describe the full range of variability of these communities.

## Case Study

### HABITAT CONSERVATION PLANNING: SPECIES PROTECTION THROUGH ECOSYSTEM MANAGEMENT

Contributed by Cathy Bleser, Darrell Zastrow, and Signe Holtz.

Since the federal government listed the Karner blue butterfly as federally endangered in 1992, the Department has been working on its protection and recovery. At present, a Rangewide Federal Recovery Plan is being developed, and in Wisconsin, where the Karner blue butterfly is most abundant and widespread, a Habitat Conservation Plan (HCP) is underway. A HCP is required for any incidental taking of the insect to be permitted by the U.S. Fish and Wildlife Service. This HCP approach calls for working with an extensive group of public agencies, private businesses, and nonprofit conservation organizations to develop a plan for conservation of Karner blue habitat. Although the butterfly lives in several different natural communities that contain its larval food plant, lupine, in Wisconsin it is found most often on barrens. In addition, barrens are home to many other state and federally listed species such as phlox moth, massasauga rattlesnake, prairie fameflower, and frosted elfin butterfly.

Although the Karner blue butterfly is the catalyst for the planning process, the Department will expand the focus to the barrens ecosystem on Department lands and encourage ecosystem considerations across the extensive range of the butterfly in Wisconsin. It has been found on public and private land across central and northwestern Wisconsin. In order to maintain this extensive range, it was apparent that there would be many players with an interest in this plan, including U.S. Fish and Wildlife Service; U.S. Department of Defense; U.S. Environmental Protection Agency; county forests; Sand County Foundation; Georgia-Pacific Corporation; Consolidated Papers, Inc.; Wisconsin Department of Agriculture, Trade and Consumer Protection; utility companies; railroad commissions; Menominee Indian Nation; Winnebago Indian Nation; and Wisconsin Woodland Owners Association.

The proposed plan would emphasize processes that maintain the shifting barrens areas across the landscape such as fire, cutting, and mowing, rather than relying solely on permanent protection of fixed parcels of land. "We want a plan that integrates conservation and economic land use in a manner that is both ecologically and economically sound. And we want to involve landowners and other individuals and groups that have interests in both using and protecting this habitat," explains Cathy Bleser of the Department's Bureau of Endangered Resources. The plan would integrate Karner blue butterfly conservation with existing land uses and would identify ways for landowners to carry out activities on their lands that will avoid or minimize harm to the butterfly and even provide additional areas of barrens for the butterfly to colonize. The plan would take a landscape-scale approach to conservation and would focus restoration efforts on those areas where the best opportunities exist.

The planning process was proposed to the U.S. Fish and Wildlife Service in April 1994, and the Department has initiated discussions with many groups. A goal of July 1997 was agreed upon as the target date for a final plan.



The Karner blue butterfly, a federally endangered species, occurs most often in Wisconsin on barrens. Here it rests on black-eyed Susan (*Rudbeckia hirta*) in Eau Claire County. Photo by Eric Epstein.



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